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Title: 75K Leak Test of October 2014

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75K Leak Test of October 2014

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Summary

A leaking flange in Room 34B in May 2014 led to an awareness that secondary containment in some rooms at the Radioactive Liquid Waste Treatment Facility (RLWTF), Building 50-01, would not hold the contents of the largest vessel in the room. A proposal was developed to unplug floor drains, thereby allowing the 75K tank to be used as a large sump. A six day leak test, conducted from Oct-02 to Oct-08, clearly demonstrated that the 75K tank is leak-free below a the level (36%) sufficient to hold the entire contents of the largest vessel within the RLWTF.

Facility Background

The RLWTF was constructed in 1963. Water treatment was simple: Influent was received in the 75K tank; water was treated via clarification followed by gravity filtration. Treated water was discharged to Mortandad Canyon.

The disposition of secondary waste streams was also simple. Any secondary liquid waste stream generated inside Building 50-01 was routed to the 75K tank in Building 50-02, where it mixed with fresh influent and was subsequently returned to Building 50-01 for clarification, filtration, and discharge. These secondary waste streams included process streams (e.g., vacuum filter water) and sink water from chemical laboratories within Building 50-01.

Secondary wastes also included water that might be found on floors in the process areas of the facility (e.g., pipe leak). All floor drains were plumbed directly to the 75K influent tank.

Commitment for the 75K Tank

In November 2011, the State of New Mexico directed the RLWTF to submit an application for a ground water permit. The application was submitted in February 2012, but said application was revised in August 2012. The revision committed LANL to stop using seven vessels whose bottoms could not be inspected for leakage. One of the seven vessels is the 75K influent tank.

In order to live up to this commitment to stop using the 75K tank, all secondary streams that went to the 75K had to be re-directed to other tanks. This was a significant undertaking because the RLWTF had operated for 49 years with the 75K as the centerpiece of process flows. The commitment required actions such as (a) re-routing vacuum filtrate water and reverse osmosis cleaning solutions to TK72, (b) re-routing the transuranic influent sump to TK01 in

Room 60, and (c) plugging all first floor laboratory sinks which, in turn, required that first floor laboratory activities be relocated to the second floor.

The commitment to stop using the 75K tank also required that all floor drains within Building 50-01 be plugged. As events later showed, this strategy had one weakness.

Flange Leak

On May 31, 2014, a Saturday, a leak developed on a pipe flange in Room 34B. When personnel responded to the alarm, water was observed spraying from a flange on the discharge side of a pump sending water from the south frac tank to the effluent evaporator. The leak was large enough to set off an alarm for rate of level change in the south frac tank (i.e., exceeded a 2% level drop in one hour). The on-call operator shut off the pump and isolated the water leak. Approximately 2800 gallons of water leaked onto the floor of Room 34B.

Had the alarm response taken longer, water would have begun leaking to the environment from underneath the doors of Room 34B. This realization led directly to the question of whether a large leak might also pose this risk in other rooms, and led to the concept of un-plugging floor drains that were installed less than two years earlier. While the 75K tank would no longer be used for influent storage, it would be available for use as a sump for floor drains in the event of a large tank leak such as was experienced with the south frac tank.

It was agreed to propose this concept to the New Mexico Ground Water Bureau (GWB). Two actions were identified to support the proposal, a study to identify other rooms with this risk, and a leak test of the 75K to demonstrate that it is water-worthy.

Risky Rooms

A study was launched to determine which rooms posed the risk of water reaching the environment in the event of failure of the largest vessel in the room. Study results, documented in Engineering CALC-14-TA50-0001-004, and summarized in Table1, showed that six of eleven rooms (identified by asterisk) shared the risk of water reaching the environment should the largest vessel in the room leak its entire contents: Rooms 14, 16, 34B, 61, 62, and 72.

Table 1
Secondary Containment vs. Vessel Size in the RLWTF

	Largest Vessel		Secondary Containment		
Rooms	ID	Gallons	Sq.Ft.	Gallons	
14+16	Cl #1	26,000	2,935	2,320	*
16+63	Cl #2	26,000	2,220	10,960	*
24	TK25	300	230	1,135	
34B	Frac Tank	20,000	1,620	5,030	*
36	CIP tank	300	895	470	
60	TK1	900	450	1,680	
60A	TK-7A	900	174	2,210	
61	TK08	8,000	510	1,440	*
62	TK09	10,000	125	1,940	*
70+71	TK71	10,000	960	38,310	
72	CIP tank	1,000	545	1,280	*

Leak Test of the 75K Tank

The second action in support of use of the 75K tank as a sump was a leak test of the 75K to demonstrate that it is water-worthy. In order to conduct the leak test, all flows into the 75K tank were stopped for six days in early October. (Influent was piped to the 17K influent tank during the test period.)

Parameters important to the test:

- Level probe sensitivity is 0.1%, and a level change of 0.1% or 0.2% is neither uncommon nor cause for concern.
- The facility SCADA system is designed such that any change in level probe reading is noted and saved. Hence, level changes due to probe sensitivity are captured.
- The test was conducted with a water level of 36% (27,000 gallons), a volume sufficient to hold the entire contents of the largest vessel within the RLWTF.
- Test duration doubled the leak test durations specified in both the draft Ground Water Permit (NMED, 10-31-14) and a national standard (ACI, Feb 2011).

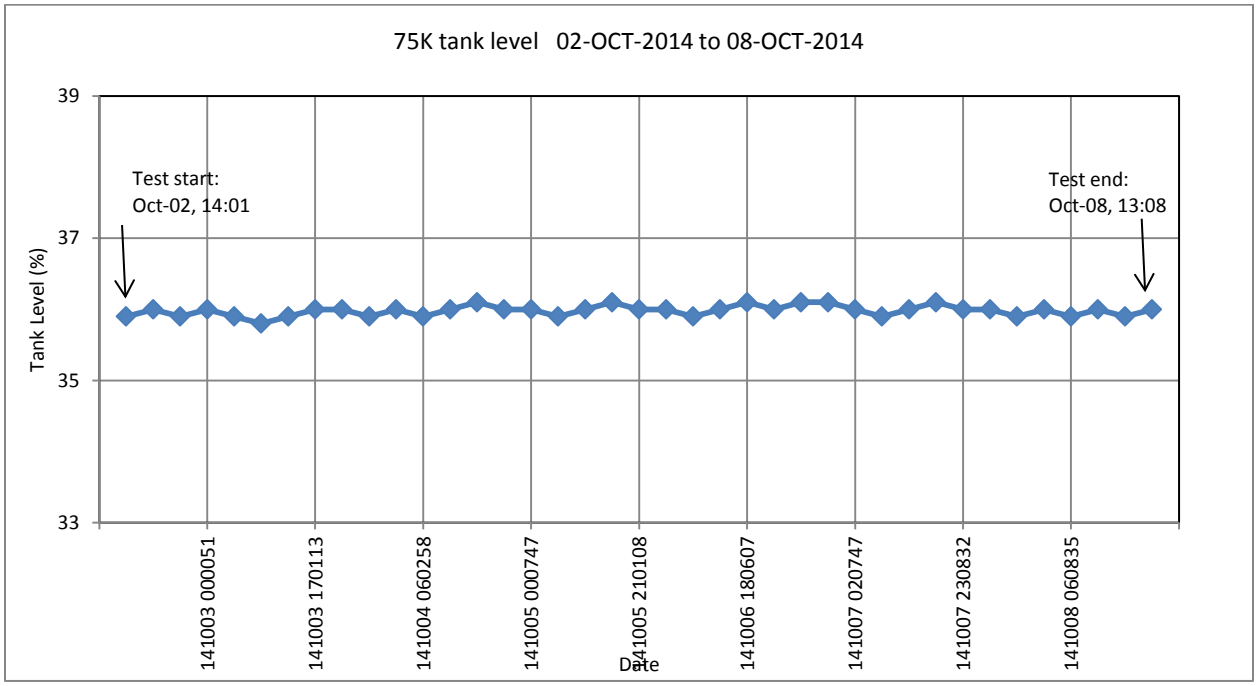
Test results are summarized in Table 2 and Figure 1. Starting water level was 35.9%, and ending level was 36.0%, within level probe sensitivity. With the exception of one data point, volume of the 75K tank measured 36.0 ± 0.1 percent for the six-day, 143-hour test. Clearly, the 75K influent tank is leak-free at levels below 36%.

Table 2
75K Tank Leak Test Results

Test start	Thursday, 10-02-2014, 14:01
Test end	Wednesday, 10-08-2014, 13:08
Test duration	143 hours
Starting level	35.9%
Ending level	36.0%
Number of readings *	39
Minimum reading	35.8% (one reading)
Maximum reading	36.1%
Average reading	36.0%

* The facility SCADA system is designed such that any change in level probe reading is noted and saved. (Level probe sensitivity is 0.1%)

Figure 1
75K Tank Leak Test Results



References

American Concrete Institute, February 2011. “Specification for Tightness Testing of Environmental Engineering Concrete Containment Structures”, ACI 350.1-10.

New Mexico Environment Department, 10-31-14. “Draft Groundwater Discharge Permit DP-1132 for the RLWTF”, Condition VI.8.